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PRE-APPEAL BRIEF REQUEST FOR REVIEWDocket Number (Optional)
GP-302246 (8540G-000136)

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Application Number
10/803,614Filed
March 18, 2004First Named Inventor
Rohwer, et al.On December 20, 2006Art Unit
1745Examiner
Alix Elizabeth Echelmeyer

Signature

*Anna M. Budde*Typed or printed name Anna M. Budde

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

Yes

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor

☐ assignee of record of the entire interest.

See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

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Registration number 35,085.

☐ attorney or agent acting under 37 CFR 1.34.

Registration number if acting under 37 CFR 1.34 _____

Anna M. Budde

Signature

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Typed or printed name

248-641-1600

Telephone number

December 20, 2006

Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/803,614
Filing Date: March 18, 2004
Applicant: Rohwer, et al.
Group Art Unit: 1745
Examiner: Alix Elizabeth Echelmeyer
Title: BALANCED HUMIDIFICATION IN FUEL CELL PROTON
EXCHANGE MEMBRANES
Attorney Docket: GP-302246 (8540G-000136)

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Pre-Appeal Brief Request for Review

Sir:

Applicant requests review of the Final Rejection mailed October 23, 2006 in the above identified Application. This request is filed along with a Notice of Appeal.

REMARKS

Claims 1-21, 23, and 24 are pending in the application and stand finally rejected. Applicants respectfully submit that the Final Office Action mailed October 23, 2006 fails to recognize at least two express features of independent Claim 1, namely the

combination of references do not teach or suggest a gas diffusion medium having: (i) at least one capillary element extending from a hydrophobic layer to a hydrophilic layer, or (ii) a hydrophilic layer formed adjacent a membrane electrode assembly (MEA).

1. REJECTION UNDER 35 U.S.C. § 103 – NESLON IN VIEW OF OUVRY IN FURTHER VIEW OF LLOYD

Claims 1 to 3, 10 to 21, 23 and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson et al. (U.S. Patent No. 6,150,049) in view of Ouvry et al. (U.S. Patent Number 6,444,347) in further view of Lloyd et al. (U.S. Pre-Grant Publication No. 2004/0086775). This rejection is respectfully traversed.

The Office Action mailed October 23, 2006 failed to recognize Applicants' express claim feature of a *capillary element* that is absent in the prior art combination.

Capillary elements 322 are different from the pores of a gas diffusion medium. This is evidenced by Figures 3-5 in the present application that show the capillary element 322 extending from a water flow channel 330 inside a separator plate 302, 304, through a hydrophobic layer 324, and terminating in a hydrophilic layer 326. The specification also states that the capillaries 322 are formed as a blind bore or via 328 extending into the gas diffusion media. Paragraph [0054]. Therefore, the capillaries are not pores present as part of the porous diffusion media. The capillaries are in addition to pores or interstices of the media. Thus, it should be recognized that the Lloyd reference does not describe the claimed capillary elements 322.

Applicants further point out that the claims require the capillary element to terminate in the hydrophilic layer 326. This is necessary so that liquid water flow is not directly provided to the face of catalyst in the MEA. Paragraph [0054]. In contrast, Lloyd merely describes a porous gas diffusion layer having a volume of interstices

relative to the volume of the material. Such a layer is provided, for example by Toray carbon paper. Lloyd paragraphs [0033] & [0038]. Lloyd does not describe any particular spatial placement of pores (e.g., starting in one layer and terminating in another). Hence, Lloyd does not describe the capillary elements of the present claims.

It is also respectfully noted that diffusion media are generally porous and gas permeable. Paragraph [0034]. Thus, the capillary elements of the claims are embedded in gas diffusion media *already having pores*. A skilled artisan further appreciates that the claimed capillary element is different from a pore in porous substrate. Consequently, Lloyd does not teach a capillary element.

The Office Action mailed October 23, 2006 also failed to recognize Applicants' express claim feature of a gas diffusion medium having a *hydrophilic layer formed adjacent a membrane electrode assembly*, which is absent in the prior art combination.

As noted by the Office Action, Nelson fails to teach a gas diffusion medium having a hydrophilic layer adjacent the MEA. Office Action October 23, 2006, page 3. Applicants also respectfully submit that the cited Ouvry reference does not provide such a teaching. Ouvry merely describes an electrode having hydrophilic carbon cloth surrounded by a hydrophobic polymer matrix (e.g. PTFE or PTFE/Nafion). Ouvry col. 5, lines 1-27; col. 9, lines 1-7; Figure 1; and Claims 1-3 and 6-10. Since the hydrophilic layer of Ouvry is surrounded by the hydrophobic matrix of the electrode, the Ouvry hydrophilic layer cannot be adjacent the MEA.

In contrast, present Claims 1 to 3 and 10 to 15 recite a gas diffusion medium with a hydrophilic layer adjacent an MEA. An MEA includes a proton exchange membrane (PEM) having anode and cathode catalysts formed on opposite sides thereof and

defining active areas on the MEA. Paragraph [0036]. The MEA has an active area formed on a PEM. A PEM is different from an electrode coating, which is what the carbon paper of Ouvry is adjacent.

This point is particularly illustrated by the claims of the Ouvry reference. For example, Ouvry Claim 10 recites an electrode having catalysts in contact with a solid electrolyte. Then, Ouvry Claim 11 recites an electrochemical fuel cell having a PEM *and* the electrode of Ouvry Claim 10. Thus, Ouvry *differentiates* the hydrophobically coated electrode from the PEM. These claims thus demonstrate that the hydrophilic carbon paper of Ouvry is not adjacent to an MEA, and therefore the reference combination does not disclose all of the limitations of present claims 1 to 3 and 10 to 15.

2. REJECTION UNDER 35 U.S.C. § 103 - NESLON IN VIEW OF OUVRY, LLOYD, AND IMHASHI

Claims 4 to 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson in view of Ouvry, Lloyd, and in further view of Imahashi et al. (U.S. Patent No. 5,350,643). This rejection is restfully traversed.

As established in the preceding remarks Nelson, Ouvry, and Lloyd do include a capillary element or a gas diffusion medium having a hydrophilic layer adjacent a membrane electrode assembly (MEA). Furthermore, these references do not provide any appreciation, suggestion, or motivation for including either the capillary element or the particular gas diffusion medium hydrophilic layer adjacent to the MEA, as found in independent Claim 1 and its dependent Claims 4 and 9.

Addition of the Imahashi reference, cited by the Examiner as a reference teaching hydrophobicity gradients, does not cure these deficiencies. Imahashi fails to teach, suggest, or motivate a skilled artisan to include the presently claimed capillary

elements and diffusion medium having a hydrophilic layer adjacent an MEA. In sum, all four references are silent as to these features.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request the Board and Examiner to reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Board and/or Examiner believe that personal communication will expedite prosecution of this application, they are invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: December 20, 2006

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